

ABSTRACT OF THE DISCLOSURE

The present invention provides methods and apparatuses for writing information to, reading information from, and erasing information on a luminescent data storage medium comprising Al₂O₃. The method includes writing and erasing of the information using photoionization via sequential two-photon absorption and non-destructive reading the information using one-photon absorption and confocal fluorescent detection. The apparatuses for writing and reading the information incorporate confocal detection and spherical aberration correction for multilayer volumetric fluorescent data storage. The methods also allow multilevel recording and readout of information for increased storage capacity.